REMARKS

I. Introduction

In response to the Office Action dated December 13, 2004, claims 2, 3, 7, 20, and 22 have been cancelled, claims 1, 4-6, 8, 11, 16, 19, 21, and 23 have been amended, and new claims 27-31 have been added. Claims 1, 4-6, 8-19, 21, and 23-31 remain in the application. Re-examination and re-consideration of the application, as amended, is requested.

II. Drawings

Submitted herewith are 4 sheet(s) of Formal/Replacement Drawings for completion of this application. Should minor matters still remain that can be resolved in a telephone interview, it is requested that the undersigned attorney be contacted.

III. Prior Art Rejections

In paragraphs (1)-(2) of the Office Action, claims 1-8, 12-14, 16-23, and 26 were rejected under 35 U.S.C. §102(b) as being anticipated by Lim, U.S. Patent No. 5,638,126 (Lim). In paragraphs (3)-(4) of the Office Action, claims 9-11, 15, and 24-25 were rejected under 35 U.S.C. §103(a) as being unpatentable over Lim in view of Gonzales et al., U.S. Patent No. 5,231,484 (Gonzales).

Specifically, the independent claims were rejected as follows:

> Regarding claims 1 and 19, discloses a program storage media storing computer executable instructions, the instructions to cause a computer to:
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> estimate forms of a plurality of functions, each function relating encoded size to encoded quality for an associated frame belonging to a sequence of frames, each frame having data for an image (fig. 1, element 10 is the controller connected to the buffer 120 that receives various sizes or amounts of frame image data encoded by coder 110, where a sequence of frames is sent through the encoding system of fig. 1 in that since Lim's invention uses an MPEG encoder for encoding a plurality of images, I, P and B frames, each frame within that sequence of frames (GOP) have different sizes, and further, note quantization controller 10, there is a selector 160 that decides which quantization parameter to use on the evaluated frame(s) in order to properly allocate the number of bits to the evaluated frame(s) for efficient coding);
>
> estimate a best quality value for producing encoded frames whose encoded sizes satisfy one or more constraints, the constraints being associated with one or more of a transmission line bandwidth, a receiver buffer size and a total size constraint, the estimating a best quality value being based in part on the functions (fig. 1, element 10 is the controller connected to the buffer 120 that receives various sizes or amounts of frame image data encoded by coder 110, where the process of generating the encoded data at an acceptable bit rate for transmission in that a recursive process is done to monitor the quality of the encoded bit frames by checking on the buffer fullness to determine the total size constraint, and note Qp adjuster 130 adjusts the quality of the encoded frames and

element 160 selects the best quality value Qp, thus, best quality value is estimated; see col.3, ln.47-53); and

order transmission of frames of the sequence, at least some of the frames being encoded with a quality based on the best quality value (fig. 1, note data from buffer 120 is transmitted to transmission for transmission of frames of the sequence of images).

Note claims 2-7, 12-14, 20-22 and 26 have similar corresponding elements.

Regarding claim 16, Lim discloses a system for encoding image frames, the system comprising:

a variable bit rate encoder (fig. 1, element 110); and

a controller connected to receive data on sizes on image frames encoded by the encoder and to control quality of the encoded frames produced by the encoder, the controller capable of causing the encoder to generate encoded data at a rate responsive to one or more of a bandwidth of a transmission line, space in a receiver buffer and a total size constraint (fig. 1, element 10 is the controller connected to the buffer 120 that receives various sizes or amounts of frame image data encoded by coder 110, where the process of generating the encoded data at an acceptable bit rate for transmission in that a recursive process is done to monitor the quality of the encoded bit frames by checking on the buffer fullness to determine the total size constraint, and note Qp adjuster 130 adjusts the quality of the encoded frames and element 160 selects the best quality value Qp; see col.3, ln.47-53).

Applicants traverse the above rejections for one or more of the following reasons:

(1) Neither Lim nor Gonzales teach, disclose or suggest estimating functions, performing a search of all frames in a sequence, encoding each frame, determining if constraints are met, and transmitting already encoded frames if the constraints are met;

(2) Neither Lim nor Gonzales teach, disclose or suggest estimating a new form if encoded frames do not meet various constraints; and

(3) Neither Lim nor Gonzales teach, disclose or suggest estimating forms across a sequence of frames in parallel on multiple processors.

Independent claims 1, 16, and 19 are generally directed to encoding data. More specifically, forms of a plurality of functions are estimated. Each function relates encoding size to encoded quality for each frame in a sequence of frames. Before encoding any frames in a sequence, a search of all frames in the sequence is performed to determine a best quality value for encoding the sequence. The encoded sequence satisfies various constraints. Once the best quality value is determined, each frame of the entire sequence is encoded with the best quality value. Thereafter, a determination is made regarding whether each encoded frame in the sequence satisfies the constraints. If the encoded frames satisfy the constraints, the system merely transmits the already encoded sequence of frames. However, as set forth in the new dependent claims, if one or more

encoded frames do not satisfy the constraints the process repeats by estimating a new form for a function which is based on the prior estimating and search. Thereafter, the search, encoding, and determining steps are repeated based on the new form.

In addition, dependent claims provide that the estimating of the forms across the sequence of frames is conducted on multiple processors in parallel. Such parallel processing does not add new subject matter since such parallel processing was previously cited in prior dependent claim 11. Accordingly, no new search is required at this time.

The cited references do not teach nor suggest these various elements of Applicants' independent claims.

Lim merely describes a quantization parameter is decided in response to input data and a control signal for use in a video signal encoding device which quantizes and encodes the input data and transmits the encoded data by way of a buffer, wherein the control signal representing the degree of fullness of the buffer. It should be noted that Lim completely fails to perform any search prior to encoding frames. Instead, Lim specifically determines the quantization parameter on-the-fly while evaluating the fullness of a buffer (see col. 3, lines 47-53). Accordingly, rather than evaluating the frames in a sequence prior to transmitting, Lim teaches away from such an implementation by evaluating the buffer fullness which is determined after the quantization for one frame is determined and while a second frame or frame slice is being processed (see col. 4, lines 8-20).

Gonzales merely describes a system and method for implementing an encoder suitable for use with the proposed ISO/IEC MPEG standards including three cooperating components or subsystems that operate to variously adaptively pre-process the incoming digital motion video sequences, allocate bits to the pictures in a sequence, and adaptively quantize transform coefficients in different regions of a picture in a video sequence so as to provide optimal visual quality given the number of bits allocated to that picture. However, unlike the present claims, Gonzales fails to describe the specifically claimed sequence of steps set forth in the present claims: determining forms for a plurality of functions; a search of all frames in a sequence for a best quality value; encoding each frame with the best quality value, determining if constraints are satisfied, and transmitting the sequence if the frames satisfy the constraints. In this regard, Gonzales completely fails to perform the determining step as claimed or the transmitting of frames that are already encoded if various constraints are satisfied by the encoded frames.

In addition, Gonzales fails to address any of the limitations in the new dependent claims and prior dependent claim 11. Specifically, Gonzales fails to teach, disclose, or suggest, implicitly or explicitly, parallel processing in any form as claimed. In addition, Gonzales also fails to even remotely suggest the repetition of an estimation of form, search of the frames, and re-encoding of the frames if the already encoded frames fail to satisfy various constraints. In fact, Gonzales teaches away from such a repetition. Specifically, Gonzales states in col. 11, lines 28-35:

> In general, such a system would require knowledge of the contents of the entire sequence prior to coding the first picture or frame. It would also require a priori knowledge of the visual quality that reconstructed pictures would have when coded using a given bit allocation. The first requirement is impractical because of the potentially large storage and delay implied.

Thus, since the present invention evaluates the entire sequence prior to encoding, Gonzales' statement that having such knowledge is impractical teaches away from the present invention's claims. In this regard, Gonzales completely fails to even remotely contemplate the use of parallel processors and the numerous steps that are set forth in the present claims.

Applicants also note that original claim 11 (that provided for the parallel processing), was rejected based on Gonzales. However, the rejection failed to even address the claim language relating to parallel processing set forth in original claim 11. Applicants further note that an electronic search of Gonzales for the term "parallel" provides no results whatsoever. Accordingly, without even mentioning the word "parallel", Gonzales cannot even possibly teach the parallel processing as set forth in the claims.

Moreover, the various elements of Applicants' claimed invention together provide operational advantages over Lim and Gonzales. In addition, Applicants' invention solves problems not recognized by Lim and Gonzales.

Thus, Applicants submit that independent claims 1, 16, and 19 are allowable over Lim and Gonzales. Further, dependent claims 4-6, 8-15, 17-18, 21, and 23-31 are submitted to be allowable over Lim and Gonzales in the same manner, because they are dependent on independent claims 1, 16, and 19, respectively, and thus contain all the limitations of the independent claims. In addition, dependent claims 4-6, 8-15, 17-18, 21, and 23-31 recite additional novel elements not shown by Lim and Gonzales.

IV. Conclusion

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited. Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Respectfully submitted,

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